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CONTENTS

COVER STORY

John F. Sullivan, Jr., the new president of the Western Society of Engineers is shown on our front cover. Mr. Sullivan is manager of construction, Commonwealth Edison Company, Chicago. He joined the Society in 1928, and has served previously as treasurer, 1st, and 2nd vice-president of the Western Society.

they're off!

As an opening gesture a number of V.I.P.s (very important persons) have entered a competition to obtain new members for W.S.E. Their efforts are recorded from week to week on a chart displayed in the W.S.E. lounge.

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Some Engineering Aspects of

The Chicago No. 3 Toll Office

By W. L. Carroll

In the early 1890's it became apparent that the communication facilities then serving the growing metropolis of Chicago would be inadequate. Termination of additional open wire lines at 105 Quincy which was the long distance communication center of Chicago would not only be impractical but eventually impossible. In order to relieve this congestion the Morrell Park office was established on a prairie seven miles south of the business center.

By 1926, through the evolution of technology and service requirements, all of the operating formerly done at Morrell Park had been shifted back to down town Chicago. Long distance operations were concentrated at other offices located at 212 West Washington Street.

By 1948 service requirements necessitated the building of a new long distance center. This office is located at 85 West Congress Street and houses Chicago's first automatic long distance switching system.

This historical process is repeating itself for early in 1951, it became evident that the demand for long distance service would require facilities far in excess of those which could be cared for in the two existing toll offices. The capacity of the No. 2 office toll switching system was limited and it would be necessary to augment these facilities considerably in order to care for the future expansion of toll dial service. Studies indicated that, under the nation-wide plan for toll dialing, a second toll dial office would be required in Chicago.

About the same time, plans were well under way for the dispersion of toll service in the city. It appeared desirable, therefore, to locate the new toll center some distance from the loop area so that, in the event of a major disaster in the loop area, it would be possible to give some toll service during such an emergency.

Further, under the nation-wide plan for toll dialing, Chicago had been selected as a regional center. Under this plan, the regional offices are arranged to provide automatic alternate route paths for long-distance calls to speed up the service. For example, the present toll dialing system in the No. 2 toll office will attempt to complete all calls presented to it, however, if sufficient circuits are not available to the called point at the time the call is presented, the originating operator receives a "no-Circuit" indication and must make subsequent attempts to complete the call. Under the alternate route plan, if direct circuits are not available to the called point, other paths may be utilized via some other point so that the call may be completed on the first attempt. This not only speeds up the service to the long distance user but makes more efficient use of the toll circuits provided in a given area. Because of its location and the manner in which the office will function, No. 3 Toll will house a great many types of equipment. Provision is being made to handle three classes of toll message circuits. Incoming circuits, which are used to complete toll calls to local Chicago numbers and numbers in the Chicago metropolitan area are brought through No. 3 and terminated in the Stewart cross-bar tandem unit located in the Stewart local office, one-half mile to the east. Outgoing circuits, which are used for completing calls originating in Chicago for New York, Cleveland, Cincinnati and Indianapolis are connected to intertoll trunk concentrators located at Chicago 3. Two-way circuits as well as some one-way incoming and one-way outgoing circuits will be terminated in a No. 4A toll switching system. In addition to the toll message service, provision is being made to handle a portion of the private line telegraph and teletypewriter service terminated in Chicago.

With this as a general background, let us take a look at the individual types of equipment that will be required to make all this possible. First, let us consider the line facilities. Since Chicago 3 is located fairly close to existing toll cable routes to the east and south, certain of these toll cables will be intercepted at a point near the office and brought through for the termination of K-1, K-2, L-1, L-3 and N carrier circuits. The existing coaxial cable route to the east via South Bend is being developed for the application of L-3 carriers which will make available about three times the number of message circuits over the same facilities. To augment the existing coaxial cable route to St. Louis via Terre Haute, plans have been completed for the installation of TD-2 micro-wave equipment which will be used for both telephone message circuits and two-way television channels. "N" carrier will be employed on short haul routes to develop additional circuits to nearby points. In addition, some voice circuits will be employed.

Signaling over the toll circuits will be accomplished through the use of two types of circuit. The older type units will employ 1600-cycle signaling in both directions over four-wire circuits and 1600-cycles in one direction with 2000-cycles being used in the opposite direction over two-wire circuits. The latest type units will utilize 2600-cycles in both directions over four-wire circuits and 2600 and 2400-cycles over two-wire circuits. Composite signaling will be employed on short haul voice circuits. "N" carrier does not require separate signaling circuits since signaling is accomplished over the individual carrier channels.

All of the one-way circuits terminating in the Stewart Cross-bar tandem unit require terminating sets to bring

Mr. Carroll, project supervisor, American Telephone and Telegraph Co., presented this talk before a Noon Luncheon Meeting of the Western Society of Engineers at the Society's headquarters on Feb. 24, 1954.

the four-wire lines down to two-wire. The trunk relay equipments used to terminate the tandem trunks from the various switchboards into the inter-toll trunk concentrators are arranged to convert the two-wire switchboard circuits to four-wire operation on the concentrators.

This is a good place to have a look at the intertoll trunk concentrators. A concentrator frame consists of two bays of 10 by 20 cross-bar switches and a controller unit arranged in such a manner to give 100 incoming trunks from switchboards access to 40 intertoll trunks. The 40 intertoll trunks are spread across the horizontals of four cross-bar switches, thence multipled to the other switches in the two bays. The 100 tandem trunks are divided into five groups of 20 each and connected to the verticals of the switches in such a way that any one of the 100 tandem trunks can be connected by the controller to any one of the 40 intertoll trunks. The concentrators are used primarily to relieve the No. 4 toll switching system of outward traffic to New York, Cleveland, Cincinnati and Indianapolis.

A No. 4A type toll switching system is being provided and is being arranged to care for an ultimate capacity of 6500 intertoll trunks. The 4A system has all of the features required for the alternate routing of calls under the nation-wide plan for toll dialing by operators and ultimately customer dialing. In the 4A system, decoders and card translators are employed to determine how calls shall be routed. Chicago 3 will utilize both home area and foreign area translators. One emergency translator is being provided which can be arranged for either home or foreign-area use.

The card translator unit is a very ingenious and interesting device. It gets its name from the fact that metal cards are used in the translation process. This type of translator is new with the 4A system and is quite different from the conventional relay-type translators used in other systems.

Each card translator contains metal cards which provide the switching information. The uncoded card contains 118 holes and across the bottom are 40 tabs. The tabs are used to mechanically code the card so that the proper card can be selected in the card translator. This is done by removing some of the tabs so that the remaining tabs are arranged in a definite pattern. The holes in the card are also coded. These correspond to the switching information needed for a particular called code. Each of these holes has a meaning and the switching information is put on the card by enlarging certain of the holes. Since the metal cards are devoid of information, templates are required for their preparation.

Each card translator can accommodate a maximum of 1,020 cards and each card has a different combination of tabs left on it so that only one card provides translation for one called code. In the translator, the cards are stacked between a light source and a bank of pho-

totransistors. There is one phototransistor for each hole in the card. Each phototransistor has an amplifier and detector circuit associated with it. These circuits are used to operate relays that correspond to the enlarged holes in the card and thus transmit information to the decoder.

In the translator, the stack of cards rests on 40 code bars which correspond to the 40 code tabs. When the decoder connects to its card translator it operates certain code bars in the translator to drop the desired card. Since each card in one card translator has a different combination of code tabs only one card drops at a time. All the rest remain in their original position. When this happens, beams of light are transmitted through the enlarged holes, energizing the phototransistors which, in turn, pass information to the decoder through the operation of relays. It is interesting to note that when the card translator is unoperated the light has no effect on the amplifier and detector circuits. However, when a card is dropped these circuits are activated and then the light becomes effective.

It might be interesting at this point to see just how a typical call would be handled by this equipment. As soon as the sender has received the information pulsed into it by the operator, it is connected to a decoder through a connector. Let us assume that our call is for Minneapolis. As soon as the decoder receives the three-digit route code information for Minneapolis, it drops this particular card in its associated home translator. This card, when dropped, tells the decoder which type of marker will be required to complete the call, that is, whether the group of trunks to Minneapolis is on the Intertoll or Toll Completing train. Likewise, information is given to the decoder as to the trunk block location of the Minneapolis trunks. Upon receipt of this information, the decoder calls in the proper type marker, passes this information along and the marker then tests the trunks in the group for an available trunk. Finding one available, it proceeds to establish the call through the offices. Meanwhile the decoder has completed its work and dropped off to be available for another call.

Suppose no direct trunks to Minneapolis were available at that time. Information from the card in the translator tells the decoder that, in the event no direct trunks are available, the call can be routed via Omaha. In this case, the decoder, through another means, first looks at the Minneapolis circuit group and, finding all trunks busy, then looks at the Omaha group. Assuming a circuit is available to Omaha, the decoder then calls in the proper type marker to complete the call. In this case the three-digit code for Minneapolis is spilled forward to Omaha so that the call can be completed from that point. The same principles would apply if more than one alternate route is available.

At the time the 4A system is placed in service at Chicago 3, the existing No. 4 system at Chicago 2 will be arranged to spill forward all digits presented to it. In addition, since some of the intertoll trunk groups will be terminated at No. 2 and other trunk groups at No. 3, arrangements have been made to provide trunks between the two machines for access to all groups. These intermachine trunks, as they are called, will be arranged to operate on a "zero-loss" basis so as not to impair transmission on through calls. Trunks between the No. 3 office and the No. 1 office for access between dial and manual circuits will be arranged in the same manner.

No. 3 Toll would not be complete without some switchboard equipment. Installed here are 45 outward toll positions and 24 intertoll dial assistance positions. All 69 positions are 3CL type, arranged to operate on a two-wire basis. This is one of the first applications of 3CL type board for intertoll dial assistance work with No. 4 type cross bar systems. 12 of the 45 outward and ten of the 24 intertoll dial assistance positions have been arranged to handle both outward and dial assistance calls. With this arrangement, during heavy peaks of either type of traffic, additional positions are gained by using the combined positions in the other line of board. Outward long distance calls handled by this office originate from areas immediately adjacent to the No. 3 toll office.

At the beginning of this paper, it was pointed out that a portion of the private line telegraph and teletypewriter services terminating at Chicago would be handled at No. 3. To care for this, three positions of No. 2 type telegraph service board and two positions of No. 2 type facility board have been provided. The new No. 2 service board is a radical departure from the old method of terminating and testing private line telegraph and teletypewriter circuits. Connection of these circuits in the older type boards such as the No. 4, No. 5 or No. 9 type boards was accomplished through the use of telegraph loop terminal circuits, commonly referred to as TLT circuits which consisted of anywhere from 5 to 10 jacks per TLT to facilitate patching and testing. Circuits in these boards were tested on a DC basis. The new No. 2 service board utilizes electronic hub operation wherein the DS signals coming from the telegraph channels or repeaters are converted to electronic operation through the board. This permits the connection of electronic repeaters which insure perfect signals being sent to all lines or legs connected to the hub circuit. Further, only one jack is required for the termination of each line or leg while in the older boards one complete TLT circuit is required. Each jack, to which a line or leg is connected, has an associated lamp which indicates whenever signals are being transmitted from that source making it possible for the tester to quickly identify the sender, open legs or hits. Patches can be quickly made, using spare equipment available for this purpose. Whenever a patch is made, the circuit replaced is automatically transferred to a test jack at the upper part of the jack field for ready access for testing. Circuits at Chicago 3 are derived basically from 40-C-1 carrier telegraph systems.

All of the equipment mentioned requires power for its operation. Several different voltages will be employed. 130-volt positive potential is required for plate circuits. Both 130-volt positive and negative are required for telegraph channel equipment. 24-volt negative potential will be used mainly for filament operation and 48-volt negative is required for the 4A crossbar system. 12-volt, 130-volt and 250-volt potentials are required for the TD-2 micro-wave equipment and motor-alternators are required for the L-3 carrier equipment.

The 48-volt plant is the largest of those mentioned. It has been arranged for an ultimate capacity of 10,000 am-

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The Annual June Dinner Meeting

Above: William V. Kahler receiving Honorary Membership Scroll from Charles E. DeLeuw.
Top: Retiring President DeLeuw congratulating President Elect Sullivan.

Three hundred persons, plus or minus zero, attended the Western Society's 1954 Annual Meeting and Dinner in the Society's Dining Room on June 7, 1954. They enjoyed a prime filet mignon dinner in addition to the usual festivities. This was the first time in the history of the Society that the Annual Meeting was held, as a dinner, in the Society's own headquarters. As a crowning touch, a liqueur was served following dinner.

Charles E. DeLeuw, the retiring president of the Society, greeted the guests and introduced the members of the Board of Direction, seated at the speakers' table. He called particular attention to the newly elected trustees, Mr. Joseph Kucho of the Link-Belt Company, who performed so excellently as chairman of the Program Committee during the 1953-54 fiscal year; and Mr. O. G. Smith, chief engineer, Chicago Area, for the Illinois Bell Telephone Company, who worked zealously on both the original headquarters improvement and our most current expansion.

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Above (left to right): William V. Kahler, Charles E. DeLeuw, and John F. Sullivan, Jr.

At the Speakers Table

Above (left to right): John P. Clennon, Charles W. Walker, and Ovid W. Eshbach.

At top (left to right): William R. Marston, George L. Jackson, and William W. Pomerhn.

Second from top: Gustav Egloff, Alf Kolflat, O. G. Smith, and George L. Seaton.

Third from top: J. T. Rettaliata, Clifford B. Cox, Robert S. Hammond, and Joseph Kucho.

Above (left to right): Charles E. DeLeuw presenting Service Awards to Committee Chairmen Charles W. Walker and William W. Pomerhn.

Two Problems Face Atomic Power Plants

Two major problems will have to be solved before any private company can seriously consider investing substantial amounts of money in atomic power plants.

R. L. Doan, manager of the atomic energy division of Phillips Petroleum company, made the statement Mar. 16 as he addressed the sixteenth annual American Power conference, sponsored by Illinois Institute of Technology, at the Sherman hotel in Chicago.

He said industry still faces the problems of investment and operating costs on the one hand and the problems of revenue from sale of products on the other.

"If one is thinking exclusively in terms of generating electrical power from nuclear fuels," he said, "it would appear to be necessary to limit the cost of the entire plant to a maximum of $200 per electrical kilowatt."

It also would be necessary to keep operating costs low enough so that delivered power would cost no more than five mills per kilowatt hour, he added. Most proposals for atomic power plant design run considerably higher than these requirements.

With regard to sources of revenue from nuclear reactors, he recommended that all possibilities be given careful consideration in determining the overall economic picture.

"Electric power, so much in the public eye at the present time, is only one of these possibilities, perhaps even a minor one except for those areas of the world where more conventional sources of energy are scarce and costly," he said.

The major income-producing item from a nuclear power plant probably would be fissionable material," he said. If the time comes when private industry is permitted by the government to own these materials, their production and sale could become quite important.

Additional income would be derived from sale of radioactive isotopes produced in the reactor and from irradiation services, he added.

Atom Electric Plants Will Specialize

Atomic plants for producing electrical power probably will be useful in specialized applications but will cause no revolution in the power industry, at least in the foreseeable future.

That was the opinion expressed Mar. 26 at the Sherman hotel, Chicago, by Donald H. Loughridge, dean of Northwestern Technological institute, Evanston, Ill., at the sixteenth annual American Power conference, sponsored by Illinois Institute of Technology.

"We should not expect atomic fuel to bring about a new era in power generation," he said, "because it will be hard for it to compete with fuels now in use."

Because of cheap fuel and water power in this country, Loughridge explained, no more than 3 per cent of the total cost of electric power generation in the past 50 years has gone for fuel and energy expense.

Loughridge noted, however, that these comparisons are "a little beside the point." The atomic age is still so new, he said, that it is impossible to predict its full impact not only on power generation but also on many other aspects of economic life.

"Who will now be so bold," he said, "as to predict the ultimate effect of the atom not only on power but on medicine, food preservation, and yet unconceived lines of industrial endeavor?"

Loughridge expressed confidence that construction of power-producing atomic reactors will go forward rapidly in spite of their cost. However, he added, industry probably will not be able to carry the ball alone but will require some government subsidizing.

Even though there are few if any sites in the United States where atomic power could compete cost-wise with that derived from other sources, he said, there are places in other parts of the world where it would be economical.

As examples, he cited the remote installations of the American armed forces that now must ship in fuel to generate the power they need. Nuclear plants would free the services from the necessity of continually shipping fuel to these installations, he said, and probably would result in cheaper power.

"Furthermore," he said, "there are many foreign locations where power could be used at high cost if available in relatively small units."

He cited the Sudan, French West Africa, Libia, Algeria, Central Brazil, Northern Chile, and Western Australia, as being localities far removed from coal, oil, and hydroelectric resources. In most of these localities, the cost of diesel oil is greater than 25 cents per gallon, and nuclear packaged power appears to be competitive, he noted.

"It is conceivable that small power reactors could be manufactured in the United States and the fissionable material supplied by the country where such a plant was to be located.

"This should be a challenge to those manufacturing industries in this country interested in constructing reactors, and the operating experience would add to our background knowledge needed to approach the competitive power cost for commercial use in this country," he declared.

Industry's Interest in

More Education for Engineers

By L. E. Grinter, MWSE

There is indeed a striking comparison between the interest shown in the young engineering graduate today and twenty-five or thirty years ago. Today industry makes clear in many ways its intent to use every device for making the first five years of the graduate's industrial association contribute to his individual effectiveness. When I took my first industrial job my employer made it clear to me that he was merely experimenting and that he seriously questioned whether the investment of time in training a college graduate in the ways of industry would ever pay off. After a few months I myself decided that his experiment was going to be a failure, not because I couldn't learn the ways of industry, but because he did not appreciate sufficiently the usefulness of basic engineering science—so I quit the job and went back to school.

It is worth noting that I had to quit the job to go back to school. If any evening graduate courses were given in Pittsburgh, where I was employed at that time, I was not made aware of them. If the idea of cooperative graduate study on a part-time basis existed, it was not general information. Certainly my employer had no feeling of responsibility for my further education except as an apprentice. I may have helped educate him because he seemed amazed by my decision to quit a steady job for further education. He remarked that he had fired a lot of men in his time but that I was the first one who had quit without a reason. To salve his pride he withheld a hundred dollars of my salary which he classified as the value of company effort toward my apprenticeship training. I quote this case to point out the great change that has occurred over thirty years in industry-employee relations.

This article is reprinted from Journal of Engineering Education, May, 1954. Mr. Grinter, besides being a member of the Western Society of Engineers is the president of the American Society of Electrical Engineers, and is the dean of the Graduate School and director of research of the University of Florida. He gave this talk at the College-Industry Conference which was sponsored by the Relations With Industry Division of ASEE, Detroit, on Jan. 16, 1954.

Continuity Education Needed

Since we are restricted in the university by a curriculum of quite limited extent, it is necessary for the graduate to continue his education after leaving the university. He needs at least three kinds of continuing education:

(1) Special training for the job that he holds or expects to hold. This is exclusively the problem of industry since no college can effectively teach company techniques and practices.

(2) Further education in engineering or allied subjects. Evening graduate courses are provided in large cities, and home study is always available to ambitious people. Also, many progressive companies have cooperative arrangements with universities for the conduct of special courses or educational programs.

(3) Further breadth of education is essential for good citizenship which demands a broad understanding of people and the instruments of government, politics and economic institutions.

The responsibility for these three types of continuing education is a joint responsibility of the young graduate, the employer, the university and the engineering societies. All of these influences exist, but at times they have been operating at cross purposes. No individual can react favorably if he is being pulled in three directions at the same time, which is the situation if there is no plan as to how the individual graduate can advance his three-fold education, first for his immediate job, second toward greater depth in engineering, and third toward a more liberal education.

I have long believed that interest should dictate the immediate direction of each individual's education. Whenever we find a young person studying engineering merely because his father is an engineer or an engineering professor, we know that his chances of success are limited. Of course, interests change. Every teacher has the occasional experience of having some of his brightest graduates return and admit freely that they have carried on no engineering studies after graduation. The emphasis upon training for the job has separated these graduates from their profession, and once the continuity of interest in engineering study is broken it is not likely to be re-established.

A great deal of emphasis is being placed upon counseling of college students, but it does not appear that an equally effective system exists in all industry. The graduate's boss can not ordinarily serve as an effective counselor because the boss has immediate problems to be solved that require certain types of training which he must necessarily urge upon the new employee. The counselor should have a broader viewpoint based upon the long term needs of the company for people of all backgrounds of education. Such an individual can try to determine the interests of the young engineer and counsel him to seek further education that will provide an outlet for his interests either within the company or elsewhere. There is small merit in ruining a potential professional-scientific engineer to produce a mediocre executive or *vice versa.*

Creative Engineers in Short Supply

It is my belief that industry's greatest shortage of engineers during the next ten or fifteen years will be in the field of creative, professional or scientific work. *Engineers competent to produce*

creative results in research, development work and design are certain to remain in short supply no matter whether the total number of engineers becomes adequate or remains critical. A person with long experience in the field of commercial art mentioned recently that no more than one student in ten who enters that field can be depended upon for creative work in art. I fear that about the same ratio of one in ten will limit our production of creative designers and of research and development engineers. Of course, all engineering demands a modicum of creativity since even maintenance work is seldom repetitive. However, an exceptionally high level of creativity is required for the production of research and development or novel design work. Such creative minds will always be in short supply.

To an increasing extent the possibility of developing new ideas, concepts, processes or even new hardware for industrial production requires knowledge of the engineering sciences. *Statics including elasticity and plasticity, dynamics, including vibrations, fluid flow, heat flow, thermodynamics including combustion, electric flow, electronics and electric waves, physical metallurgy and the properties of engineering materials form the background engineering sciences. These engineering sciences rest upon the basic sciences of mathematics, chemistry and physics, including in the near future nuclear physics and the physics of the solid state.* No graduate of a four -year curriculum is likely to have an adequate background of the basic sciences and the engineering sciences if his job is to become a creative engineering scientist for industry or even a design engineer.

It is my suggestion then that industry scan most carefully its new recruits from the colleges of engineering to determine which ones have the interest and the ability to continue their education in engineering science. When located, these individuals represent a large fraction of the industrial potential for future creative activities including product development. It would be my thought that such individuals should all be given the opportunity and encouragement to complete their studies for the master's degree, and in more limited numbers to obtain the doctor's degree. Industry can well afford to invest much more heavily in the training of future creative personnel since it is unrealistic to expect young men who have already invested an average of four years and 5000 dollars in a B.S. degree in engineering to be willing to face a large added expense for graduate education without earned income. The Armed Services have long recognized the necessity of providing such training for officers wherever needed.

Educational Opportunities

When large industries face the problem of continued education for employees they find several opportunities. Sources on an evening school basis may be available near the plant or at cities within driving distance. If so, the typical rebate of tuition by the company may be adequate inducement for students who are taking undergraduate courses or courses for general education, but it is a rather negligible contribution to the graduate study of engineers. This problem needs to be restudied. For example, company fellowships for full-time graduate study of selected employees should be considered. A company may also decide to arrange with an educational institution to conduct graduate courses and special courses at the plant, or nearby, for Company students. When approached with the understanding that long-term educational benefits are being sought, rather than particular job training, such academic programs have real value and have been conducted successfully.

A very large company or industry may feel that it can afford a Company Institute for the training of its employees. There are examples in the automotive industry and also in the Federal Government. At a recent meeting at which a group of educators including industrial representatives were drawn together to study this problem in its relation to Federal Agencies it was concluded that the granting of degrees should not be sought by such agencies, and I am sure that the same arguments apply to industry. The immediate desire for job training is too influential in a non-academic atmosphere; the feeling of the student that education so provided must be necessary to his advancement is likely to result in classes filled with students of mediocre qualifications. There is also a lack of stability in the too frequent use of part-time teachers resulting in typically large drop-outs from classes. Academic institutions have long experience in avoiding such problems, which is really the basis of maintaining high academic standards.

With more than one hundred and

(Continued on Page 15)

WSE Secretary Is New Vice-President of Council of Engineering Societies Secretaries

The 18th Annual Meeting of the Council of Engineering Societies Secretaries was held in Detroit, Mich. May 20-22, 1954 in the headquarters of the Engineering Society of Detroit. Engineering societies throughout the United States and Canada were represented.

The program was conducted this year, for the first time, as a series of panel discussions on six topics of importance to engineering society operation. Each panel consisted of five members who answered the questions purpounded to them.

The panel topics were:

1. Publication policies and methods
2. Headquarters' facilities
3. Office administration and accounting procedures
4. Membership promotion and relationship
5. Inter-Society relations
6. Miscellaneous, including special activities, collection of dues, employment service, selection of speakers and obtaining industry support and cooperation.

The character of this program made a decided impression on those attending and resulted in a request to the incoming officers to arrange the 1955 program in a similar manner.

Dr. L. E. Brownell, director of Fission Products Laboratory of the University of Michigan was the speaker at the annual banquet.

During the course of the meeting the secretaries visited the building owned and operated by the American Society of Tool Engineers which has many unusual features. A visit also was made through the entire facilities of the Engineering Society of Detroit.

The officers elected for the 1954-55 year were Edward H. Robie, AIMME, president; J. Earl Harrington, WSE, vice-president; N. C. Turpin, ASRE, secretary; Charles S. Doerr, Engineers' Club of Philadelphia, treasurer; retiring president, Ernest Hartford, ASME, elected a director for one year. Other directors are Allan Ray Putnam, ASTE, term expiring 1957; T. J. Ess, Association of Iron and Steel Engineers, term expiring 1956; and W. P. Youngclaus, ASLE, term expiring 1955.

The next meeting of the Council of Engineering Societies Secretaries will be held in Philadelphia at the Philadelphia Engineers Club in May, 1955.

Societies represented at the Detroit meeting were:

1. The American Society of Civil Engineers
2. American Society of Mechanical Engineers
3. American Institute of Electrical Engineers
4. Western Society of Engineers
5. The American Society for Testing Materials
6. The Engineers Club of St. Louis
7. The American Society of Tool Engineers
8. The Engineers' Society of Western Pennsylvania
9. The Engineering Institute of Canada
10. The American Society of Lubrication Engineers
11. The Engineers Club of Minneapolis
12. The American Society of Heating and Ventilating Engineers
13. The Engineers Club of Philadelphia
14. The Society of Exploration Geophysicists
15. The Association of Iron and Steel Engineers
16. The Engineers Society of Milwaukee
17. Illuminating Engineering Society
18. The Engineering Society of Detroit
19. The American Railway Engineering Association
20. The Instrument Society of America
21. The American Society of Agricultural Engineers
22. The American Concrete Institute
23. The American Ceramic Society
24. The National Society of Professional Engineers
25. The Engineers Joint Council

An inspection tour of the modern headquarters facilities of the American Society of Tool Engineers, Detroit, Michigan, was one of the features of the annual meeting of the Council of Engineering Society Secretaries. The top staff executives representing total memberships of more than 275,000 inspected the physical plant, mechanical equipment, etc., used to service the needs of nearly 30,000 ASTE members. Ray Putnam, assistant executive secretary of ASTE and host for the tour, explains jobs handled by duplicating equipment to (left to right): K. F. Treschow, secretary, Engineers' Society of Western Pennsylvania, Pittsburgh; J. Earl Harrington, executive secretary, Western Society of Engineers, Chicago; T. J. Ess, managing director, Association of Iron and Steel Engineers, Pittsburgh; C. S. Doerr, executive secretary, The Engineers Club of Philadelphia; Council President Ernest Hartford, deputy secretary, American Society of Mechanical Engineers, New York; and Putnam.

No. 3 Office

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peres. The 24-volt plant has a capacity of 6,000 amperes and the 130-volt plant, 1,000 amperes. Since the crossbar load fluctuates greatly throughout a 24-hour period, the 48-volt plant is arranged to operate on a fully automatic basis, that is, as the load increases and decreases, charging equipment will be started and cut in and out automatically, as required. The 24-volt and 130-volt loads are considerably more stable, therefore manual start operation has been provided for these plants. The motor-alternators used for L-3 Carrier are arranged so that, in the event of a commercial A.C. failure, DC motors, connected to the 130-volt plant will cut in automatically to keep the alternators in continuous operation.

All of this is protected by a 750 kilowatt diesel emergency plant. The diesel plant is also arranged to provide emergency lighting and power for the entire building, including the elevator.

One of the questions posed at the start was, "when will all this become effective?" Some of it already has; in fact, just prior to Christmas, 1952, the first toll circuits were cut into the Stewart Crossbar tandem unit. Not long after that, the No. 2 service board and associated equipment was placed in service. By July of 1953, the new portion of the building had been completed and by early fall of last year, the 4A crossbar project was well under way. On February 14 of this year, the 45-position outward switchboard unit was placed in operation and by the middle of next month, a large number of additional circuits will have been added to the Stewart Crossbar tandem unit. By the middle of May, an additional 264 telegraph channels will be ready for service. The 4A project will be completed late in July and during the few weeks following, tests will have been completed on all of the circuits to be cut into the 4A system. The cut-over of the 4A system is planned for September 12.

Upon completion of this project, one more milestone will have been reached toward the goal of establishing a nationwide network of long distance service whereby the long distance telephone user can dial calls direct anywhere in the country.

U.S. and S.A. Have Like Design Problems

Housing design and building construction problems in South Africa are strikingly similar to those encountered in the United States, according to R. S. Dill, Chairman of the Committee on Research of the American Society of Heating and Ventilating Engineers, at the conclusion of a visit by S. J. P. Joubert, staff engineer of the National Building Research Institute of the South African Council for Scientific and Industrial Research.

Joubert spent several months in the United States for a study of American techniques and instrumentation in order to compile accurate and complete data on heat transfer studies of construction that will provide comfort in unconditioned houses.

He wanted to become familiar with techniques and instrumentation methods of other countries and had been a guest of the Building Research Station in England. When he arrived in this country he came to the ASHVE Research Laboratory in Cleveland. At the Laboratory, the South African visitor had available the results of solar radiation studies of 25 years.

For approximately two months, Joubert worked with the Laboratory Staff, particularly on heat transfer and thermal circuit techniques.

Annual Dinner

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Mr. DeLeuw then gave a summary of the Society's activities for the 1953-54 year which closed on May 31. He called especial attention to the fine cooperation given by Western Society members, and by industry in raising funds for the headquarters improvement-expansion construction program. He solicited continued support in order to clear up a relatively small deficit on the project. He brought particular attention to the fine work done by many of our members in the solicitation of contributions.

In reporting the lack of operating income during the fiscal year Mr. DeLeuw pointed out that construction work prevented the full use of the dining and meeting facilities of the headquarters until January 1, 1954: that all things considered, we did an exemplary job.

He called attention to the work of the Membership Committee under the guidance of Mr. Virden Staff, as chairman, and explained the new-method membership approach which had met with considerable success. Mr. DeLeuw urged that a continued effort along these lines be expended in increasing our membership during the coming year.

Mr. E. A. Schmidt was commended for the splendid job he had done as

chairman of the Advertising Committee in securing advertising for both the Year Book and MIDWEST ENGINEER.

Reporting on the success of the Young Engineers Forum held last fall, Mr. DeLeuw announced that another Forum would be held this year. He also called attention to the splendid programs that have been sponsored, not only by the General Program Committee, but also by the various Sections and Committees.

Miss Crawford was complimented for the artistic decor she had incorporated into the headquarters, and asked to stand so that those present might see the gracious lady who had contributed so much of her time, energy, and artistic ability in making our headquarters pleasing.

Mr. DeLeuw announced that he had suggested the formation of a Western Society Foundation and that the Board of Direction had concurred in its establishment. It was pointed out that with the existence of such a foundation there should be an incentive to members of means, and to philanthropists, to contribute to the Society's welfare.

In the limited time at his disposal and in deference to the other speakers on the program, Mr. DeLeuw stated, he could not mention the name of each individual committee chairman to commend him for the fine job he had done. He wished to thank, however, not only the various committee chairmen, but all the members of the Society for the cooperation they had given him. He further added that all this would not have been possible if it were not for a highly efficient office staff headed by Executive Secretary Earl Harrington.

At the conclusion of the resumé of the year's activities, Mr. DeLeuw presented the various awards. Mr. J. P. Clennon of the Peoples Gas Light and Coke Company received the Octave Chanute Medal for his paper entitled "Gas Distribution Network Analyzer." It was published in the February, 1954 issue of MIDWEST ENGINEER. Service Awards were presented to Mr. Charles W. Walker, chairman of the Special Events Committee, in recognition of his excellent management of the various social events that were held in the headquarters during the past year. A second Service Award was presented to Mr. E. A. Schmidt, chairman of the Advertising Committee, for the excellent work he had done for the Society in that field. A third Service Award was presented to Mr. William W. Pomerhn, chairman of the Western Society Education Committee, for that Committee's implementation of the courses, and cooperation with the General Education Committee. Mr. DeLeuw touched briefly on the great work the General Education Committee is doing.

Next, he read the names of those who had attained life membership, congratulated them, and informed them that on the following day their certificates would be mailed to them. The new life members are Arthur Anderson, Emerson A. Armstrong, F. D. Danielson, Carl A. Dopp, William E. Goodman, Ralph Green, F. J. Herligh, Arthur C. King, W. H. Hurtz, J. Woods McCausland, W. Lyle McDaniel, Arthur Maldaner, Edward Ottoman, Jr., Emmons Overmier, Wilfred C. Schofield, Earl B. Simpson, and Edwin H. Swenson.

Following this Mr. DeLeuw announced that Mr. Charles A. Blessing, John E. Heald, Paul Rogers, J. A. Schneider, and James H. Towle had received honorable mention for papers submitted in the Cash Award Contest and that a token of the Society's appreciation would be received in the mail.

At the conclusion of the presentation of the awards Mr. DeLeuw introduced the president of the Society for the 1954-55 fiscal year, Mr. John F. Sullivan, Jr., manager of construction of the Commonwealth Edison Company. Mr. Sullivan responded by presenting to retiring President DeLeuw a president's certificate, and continued by saying:

"Mr. President, Members and Guests,

"I am indeed honored to have been selected as your president for the coming year—particularly so when I look over the roster of past presidents of the Western Society of Engineers.

"One cannot help but be impressed with the strides the Society has made since we moved into our present headquarters, and with the wisdom of our past officers who made that decision.

"This expansion and improvement in our facilities has not been without some growing pains as Mr. DeLeuw has indicated. It is my hope that during the coming year we will be able to consolidate our gains and continue to advance.

"Speaking for your Board of Direction and officers, I am sure we are going to try and do our best, but our best efforts will accomplish little without the full cooperation of our entire membership in obtaining a large number of new members, increasing the amount of advertising to make the MIDWEST ENGINEER self-supporting, and by a greater utilization of our headquarter facilities by each and every one of you. The Board decided to hold the Annual Meeting here tonight so that you might become better acquainted with these facilities. I would like to urge that you and members of your family, and organizations to which you belong, make greater use of our meeting rooms and dining room.

"We intend to foster more social gatherings for our membership. Also,

we hope to increase activities designed for the young engineers. Our most outstanding program in this respect is the Young Engineers Forum—another session of which is being planned for this fall.

"Finally, it is my hope that a year from now we shall be able to render a report of our stewardship which will justify your faith in the officers you have chosen for the coming year."

At the conclusion of President Sullivan's remarks, Mr. DeLeuw presented Mr. William D. Kahler, president of Illinois Bell Telephone Company and past president of the Western Society of Engineers, with a Certificate of Honorary Membership in the Society, and congratulated Mr. Kahler on joining the ranks of 14 other honorary members. Mr. Kahler responded with the address of the evening. His address will be published in the next issue of MIDWEST ENGINEER.

The meeting adjourned following the address by Mr. Kahler.

MIT to Give Survey of Analogue Computation

A survey of the field of Analogue Computation will be given in a special summer program from August 2 through August 13 at the Massachusetts Institute of Technology during the 1954 Summer Session.

The purpose of this program, according to Dr. Ernest H. Huntress, director of M.I.T.'s Summer Session, who announced it last week, will be "to introduce analogue techniques to those not working directly with such computers and to broaden the knowledge and outlook of those already familiar with certain aspects of machine computation."

Lectures will cover mathematical equations encountered in engineering analysis (ordinary differential equations, partial differential equations, and simultaneous algebraic equations) and analogue equipment used to solve these equations.

Electrical and mechanical differential analyzers will be described, as well as some special-purpose devices such as flight simulators and autocorrelators. If possible, participants will be allowed to set up problems on M.I.T.'s computing machines.

This two-week program will be presented by the M.I.T. Dynamic Analysis and Control Laboratory, which is sponsored jointly by the Departments of Electrical and Mechanical Engineering. Director of the program will be Dr. John A. Hrones, Professor of Mechanical Engineering and Director of the D.A.C.L. He will be assisted by Dr. William W. Seifert and Dr. Richard C. Booton, Jr., of the D.A.C.L. staff, and other members of the Institute's teaching and research groups.

"The application of machine methods of computation can notably assist in solving many advanced engineering problems," Professor Hrones points out. "The summer program at M.I.T.," he continues, "will include critical appraisals of analogue techniques and, by describing how these techniques are applied in the study of physical problems, will show the place of analogue computation in modern engineering analysis and design."

Enrollment is open to all those whose industrial and educational experience will enable them to profit from and contribute to the program, according to Professor Huntress. Tuition will be $180; no academic credit will be given. Full details and application blanks may be obtained from the Summer Session Office, Room 7-103, M.I.T., Cambridge 39.

The Gas Turbine Allows Forward Step

A step forward in the railroads' search for locomotives that will give them more power in a smaller package was described Mar. 16 by Frank Fahland, general mechanical engineer with the Union Pacific railroad.

Fahland spoke at a session of the American Power conference, sponsored by Illinois Institute of Technology, which held its sixteenth annual meeting at the Sherman hotel in Chicago.

He described the development of a locomotive powered by a gas turbine, which appeared about four years ago and has since been given extensive tests in Union Pacific freight services.

Fahland said it is a product of the continuing search for a locomotive that would pull more tons at greater speed without a corresponding increase in cost of investment and maintenance.

Another advantage of the gas-turbine locomotives, Fahland said, is that they can operate on lower grade fuel oil than that used by diesel locomotives. Thus, he continued, they represent an important large-scale experiment aimed at reducing fuel costs.

The 4,800-horsepower turbine used in the locomotives is 20 feet long and weighs 15 tons. It drives four main electric generators, which, in turn, supply power to the drive wheels.

The Union Pacific has 10 of the new locomotives operating, Fahland said. They regularly handle trains of 5,000 tons. They can develop more than 5,000 horsepower for traction, he added, and they are capable of outperforming comparable 4,500-horsepower diesel locomotives at speeds of 20 to 50 miles per hour.

In general, Fahland concluded, all the gas-turbine locomotives have performed satisfactorily. Service costs have not been higher than those for diesel engines doing comparable work, he said.

More Education

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sixty accredited colleges of engineering available in this country no company need fail to obtain academic sponsorship for any educational program which it desires to have conducted on a graduate or undergraduate level. However, the company should not approach a university with the idea that it can have university sponsorship and still dictate the program itself. *The reason for university sponsorship is to obtain an impartial influence upon the educational program that keeps it above the level of an industrial training program.* If the latter is desired, the program should be concluded by the company on a non-credit basis. *But if graduate or undergraduate credit is desired for application to a university degree, the final decisions concerning the selection of the teacher, the course content, the prerequisite study and the selection of students can only be made by the university sponsoring or operating the program.* When this necessity is clearly recognized, a working relationship should not be difficult to achieve. I believe that we need many more cooperative company-university programs at the graduate level in many engineering fields.

A Research Grant Continues Heat Study

A $15,000 research grant has been awarded to Illinois Institute of Technology, Chicago, to continue investigation of Hausen's theory of heat transfer for application to turbo-jet planes and to organize an aircraft design manual.

The grant provides for a 10-month extension of a contract with Wright Air Development Center, Dayton, O., to check further into Hausen's theory, using the ball-packed beds method, according to Dr. Frank D. Carvin, director of the IIT mechanical engineering department.

Dr. Max Jakob, research professor of mechanical engineering is project director. Dr. Harold H. Sogin, assistant professor, is supervising the project, while Alexander Sinila, associate research engineer, has charge of the experimental work.

An Optimistic Future Faces Gas Turbines

Two Chicago research engineers took a look at the gas turbine engine and foresaw a qualifiedly optimistic future for its use for automotive purposes.

John H. Bonin and Robert A. Harmon, members of the heat-power staff at Armour Research Foundation of Illinois Institute of Technology, emphasized that only inefficient use of fuel is holding the gas turbine back as a general automotive plant.

Their talk on "Factors Associated With Use of Gas Turbines for Automotive Applications," given by Bonin, was presented at the American Power conference, sponsored by Illinois Tech, in the Sherman hotel, Chicago on March 26.

The "most inviting feature" of the turbine, they said, is its high torque and power over a large speed range, as compared to an internal combustion engine. In some cases, they went on, it would be possible for the turbine to operate with a single gear ratio.

The gas turbine engine, an adaptation of the type of engine used in jet airplanes, also has these advantages:

—Small installation space requirement (the power plant occupies only a third the space of an internal combustion engine of the same power rating).

—Light weight (net saving in weight, in the power range considered, would be about 2,000 pounds).

—Fewer parts (the gas turbine uses only a tenth of the parts required by a similar internal combustion engine. The small number of parts also makes for low maintenance costs.)

Other advantages: no cooling system needed; low lube oil consumption; electric ignition needed only for starting; turbine will operate on wide variety of fuels.

But, Bonin and Harmon said, the advantages are at least partially offset by the high fuel consumption, especially when the engine is working only at part load or at idle.

"It is apparent that fuel consumptions, competitive with current automotive engines, will not be obtained without further improvements in component performance, increase in range of effective operation, and the addition of a regenerator (a device for re-utilizing exhaust hot air)," they said.

AS for EE Meet Attracts Nearly 500

Approximately 500 representatives from seven Midwest colleges and universities and several industrial firms attended the 17th annual meeting of the Illinois-Indiana section of the American Society for Engineering Education Saturday, May 15, at Illinois Institute of Technology, Chicago.

The meeting included a general morning session and concurrent discussions in the afternoon on the major fields of engineering education, according to Dr. Ralph G. Owens, MWSE, dean of engineering at Illinois Tech and chairman of the section.

Educational institutions participating in the meeting were Northwestern university, University of Illinois, Purdue university, Rose Polytechnic institute, Bradley university, Notre Dame university, and Illinois Tech.

Air Conditioning Is Maturing

America's rapidly growing industry, Air Conditioning, owes its prominence to expansion for industrial uses, evidenced by this year's doubled expenditures for comfort conditioning by banks, hotels, manufacturing plants, and department stores. While this part of a robust enterprise grew to billion-dollar proportions, another branch was showing signs of maturity. Until recently, its stride was held in check by inability to completely answer the question homeowners most often ask about residential summer cooling, "Although I can afford its installation, can I maintain its operating cost?"

Now, a practical step has been made in the advancement of residential comfort conditioning. Whether cooling equipment is contemplated for a brown and gray Cape Cod in Atlanta, Georgia, or a green ranch style in Syracuse, New York, a reasonably accurate seasonal or monthly operating cost can be established. A workable method for predicting the cost of operation has been devised, and charts are compiled for facilitating its application.

S. F. Gilman, Chief, and L. A. Hall, Intermediate Engineer, Air Conditioning Systems and Equipment Section, Research Department, Carrier Corporation, Syracuse, N. Y., with E. P. Palmatier, the Director of Research, have prepared a paper, *Operating Cost of Residential Cooling Equipment*, for delivery at the Semi-Annual Meeting of The American Society of Heating and Ventilating Engineers in the New Ocean House at Swampscott, Mass., June 28-30, 1954.

Their investigations utilized eleven normally occupied residences in six cities in different parts of the United States. The owners co-operated so that each house was occupied in its usual manner, except that all windows and outside doors were kept closed and a thermostat setting of 72° to 75° F. maintained. Data were collected from two of the houses during the summer of 1952, and the remaining nine during the 1953 season.

The investigations began with the precise evaluation of actual cooling capacity and total power input of each installation. Effects of shading due to trees and adjacent structures were noted. The eleven conditioning units tested were dissimilar; calculated cooling loads ranged from 21,400 to 51,940 Btuh; floor areas varied 967 and 3365 sq. ft.; and three different condensing methods were used.

For seven of the test houses detailed data were secured from demand meter charts. In conjunction with weather data from the U. S. Weather Bureau, the charts were used to determine operating cost and cooling capacities over each 24-hour period. From readings of watt-hour meters and timers the actual operating hours and total power consumption of each of the eleven units were obtained over periods of approximately one month's duration.

At the end of the testing period the deviation between actual and predicted operating cost ranged from 8.0 to 13.5 percent, a satisfactory order of accuracy, since the difference in dollars ranged from only $4.43 to $14.25 for the summer. In Syracuse, where short, cool summers prevail, there was a difference of 13.5 percent between predicted and actual operating hours. In monetary terms this meant a difference of only $3.00 over a ten-week period.

Engineers Gilman, Hall and Palmatier have proved that operational cost of residential cooling equipment is proportional to degree days above 70° F. On this basis, predicted power cost for a normal cooling season is within 8 percent or ten dollars, whichever is greater. Greater accuracy can hardly be justified when year-to-year variation in the annual degree days will frequently be considerable.

Technical data secured from the investigation are of much interest to engineers, dealers and contractors, and the possibility of even greater accuracy is assured; however, the chief result is that Mr. Average Homeowner can now be shown how much he will have to pay to use residential summer cooling equipment.

Honors are Received By Engineer Students

Six outstanding engineering students, representing three Chicago area universities, were honored by receiving Honorary Junior Memberships in the American Society of Civil Engineers on Friday, May 21st at the Chicago Engineers Club at an open luncheon meeting.

Harold R. Coldwater and Leonard E. Olson of the University of Illinois; Harold F. Leiendecker and Edward H. Liebold of Northwestern University; and Thomas J. Byrne and Harvey P. Pittelko of Illinois Institute of Technology were the recipients of the awards.

The presentation is made annually to the two outstanding Civil Engineering graduates at each school, based on achievement in class and in student chapter work and on personal qualities. E. Montford Fucik, president of the Illinois Section of ASCE, presented honorary certificates. W. S. Lacher, MWSE, A. W. Howsen, MWSE and J. Earl Harrington, WSE executive secretary, of the Awards Committee worked with student faculty advisors at each school in determining the final selection.

Highway Men Know Their Salt

Highway departments are increasing use of salt in road building and maintenance, and as a weed control agent, the Salt Institute has reported, in Chicago.

In addition to the big tonnage requirements for road stabilization, salt is being used for other soil stabilization purposes, including road shoulders, alleys, parking areas, airports, driveways, outdoor theaters, drive-ins and school yards.

Soil stabilization, according to the Salt Institute, is the method of bonding the surface of an unpaved road or the sub-base of a road to be paved. The result is a smoother, more durable road. Dust and gravel throw-out during dry seasons and ruts and washouts during wet seasons are minimized, and damage due to frost boiling is virtually eliminated.

Highway engineers, faced with building and maintaining roads within budget limitations, report that salt stabilization is an effective and inexpensive means. It was first used in Michigan in 1930, and some 2,000 miles of farm-to-market roads since have been stabilized in this pilot state. To date some 21 states are using salt to improve rural roads and new highways.

Successful applications have been reported not only from the many states now active in this type of road work, but world attention also has been focused on these projects from such far away places as India, Israel, Costa Rica, Brazil, Puerto Rico, Western Canada and British Honduras.

Evidence of the value of salt in forming a hard surface is the vast salt flats of Utah, known as the world's "fastest" raceway. First use of salt for stabilization is lost to antiquity. Ancient history shows that this method was practiced in forgotten and less mechanized times. Yet, modern salt stabilization methods were not fully accepted by road construction engineers until the last decade, after they had been perfected by years of trial and error.

The Salt Institute, representing major salt producers in this country, credits discovery of salt stabilization in America to a donkey that became mired in mud as it trod in a circle, powering a pump that brought salt brine to the surface. Someone in the then fledgling salt industry discovered that the soggy trail became firm when treated with salt, giving rise to this method of stabilization.

Today, several thousand tons of salt are used to treat road surfaces, shoulders and sub-base structures. The industry says confidently, however, the potential has barely been scratched.

A surface is stabilized by mixing salt with gravel, then sprayed with water. Either rock or evaporated salt can be used. The salt dissolves to form a brine which flows in and around the gravel granules. As the moisture evaporates in the "curing" process, the salt recrystalizes, forming a hard crust or binder around the gravel.

Cars traveling at 50 to 60 miles per hour over a dry road create little dust, and trucks cause little throw-out of granular material from the surface. In wet weather, wheel ruts and washouts are greatly reduced, and the roads are less slippery.

The general formula used by road engineers on a 20-foot wide road calls for one ton of salt per mile per inch of wearing thickness of the surface, which is usually three inches. About three tons of salt per mile would be used under this condition. However, where salt can also correct severe moisture and drainage problems, upwards of 30 tons of sodium chloride may be used per mile.

Engineers estimate that salt stabilized roads cost about one-tenth as much as the more expensive surface materials and methods. The cost, they estimate, is less per square yard than the cost of the granular materials that are blown away as dust or thrown off the road by traffic on untreated roads.

Salt also offers the advantage of melting action, evidenced by its use on streets and highways during winter to melt ice and snow. This same characteristic decreases the number of freezing and thawing cycles of the road surface, which greatly reduces surface damage and the need for maintenance.

A stabilized surface enhances the safety factor, reducing the danger of skids. Another safety use for salt is in eradicating weeds along the edge of roads.

Common weeds are generally killed by the application of from one-half to three-quarters pound of salt per square foot of surface. Top growth should be removed before applying the salt evenly over the area to be treated. The treatment should be applied in early spring and fall when rainfall is more abundant to dissolve the salt.

Power Show to Be Held In Philadelphia

Announcement has been made that the 21st National Exposition of Power and Mechanical Engineering will be held at the Commercial Museum in Philadelphia, December 2 to 7, 1954. Transfer of the Power Show to Philadelphia was determined by a vote of exhibitors when Grand Central Palace in New York, where it has been held heretofore, was rented by the Government. As in recent years, the exposition will be held under the auspices of the American Society of Mechanical Engineers, whose annual meeting is scheduled in New York, November 28 to December 3. For this reason, the exposition was jointly planned to open on Thursday, during the week of the meeting, and continue through Tuesday of the week following, except Sunday, when it will be closed. Arrangements for the show are under the management of the International Exposition Company, of New York, with Charles F. Roth as manager, and E. K. Stevens, associate manager. Space has already been reserved by over 200 exhibitors.

On Training—
Letters from Leaders

In the last issue of Midwest Engineer we published another of about thirty letters received from leaders of Chicago-area firms concerning shortcomings noted in the engineers in their employ. Many of the letters also suggested what the engineers should do to correct their deficiencies.

Significantly, the engineer's technical training is generally considered adequate. In the broad area of Human Relations, however, engineers seem often to be "under achievers," according to the viewpoint of the industrial leaders as reflected in their letters.

We are printing another of these letters in this issue, as we shall do in future issues. Although the letters may be of greatest value to the younger engineers, we hope that all of the engineers who read them will benefit.

Dear Mr. Becker:

Your letter of August 31, opens an area for considerable discussion and comment, but I shall attempt to summarize the various comments made by our Engineering and Industrial Relations Vice Presidents.

First, it should be stated that we do feel that a much better job is being done in the last few years in turning out engineering graduates useful to industry. This is particularly true where at least a part of the training involves a co-op program so that the graduate has actual work experience when reporting for his eventual permanent assignment. Many of our top level engineering personnel are graduates of an engineering co-op course. This comment undoubtedly is prompted by a feeling that too often in the past the engineering graduate was not able to apply his training to practical situations. We cannot overlook the fact that the best training is wasted unless it can be applied.

One other element seems to be lacking in the present day engineering graduate, which is an inability to visualize and develop new ideas. Of course, no academic course can create a genius, but encouragement and increased opportunity to develop solutions may be helpful in this respect.

We feel, too, that the good engineer should be capable of discussing and presenting new ideas to others. He should be able to speak to a group, perhaps involving non-technical personnel in a convincing and interesting manner. At times a substitute must be found for technical engineering terms.

If it is true that the engineering and manufacturing ends of industry are more closely merged today than a few years ago, then the engineering graduate must be equipped to meet and work with operating personnel. Of course, human relations cannot be overlooked in any training program, but may have to be emphasized more and more. The days of a segregated engineering department, involving closed doors, mysterious equipment, and a peculiar jargon are fast disappearing. The engineer, today, is a member of a team and must do his part in a unified effort.

Although the above comments are general, I hope they may be of some help in your study. If we can be of further assistance, please feel free to contact us at any time.

Management Society Will Hold Clinic

The Eighteenth Annual Time and Motion Study and Management Clinic sponsored by the Industrial Management Society will be held on Nov. 10-11-12, 1954, at the Sherman Hotel, Chicago. More than 2,000 industrial engineers, works managers, plant superintendents, and supervisors are expected to attend the technical sessions, and industrial exhibits.

Topflight industrial leaders from all over the U. S. will discuss the latest developments in the fields of time study, motion economy, job evaluation, methods, plant layout, materials handling, and human relations.

Feature of the event will be the Annual Methods Improvement Contest, with awards to companies and colleges for outstanding advances in industrial engineering techniques and applications.

Inquiries may be addressed to the Industrial Management Society, 35 East Wacker Drive, Chicago 1, Illinois.

Armour Research Publishes Brochure

A colorful, 14-page brochure summarizing facilities available for metals research has been published by Armour Research Foundation of Illinois Institute of Technology, Chicago.

The brochure describes the personnel, their experience, and the services offered by the metals research department's staff of 115 technicians, engineers, and scientists.

The publication outlines the facilities available in the fields of powder metallurgy, applied metallurgy, electro-chemistry, extraction metallurgy, foundry and steelmaking, mechanical metallurgy, nonferrous metallurgy, physical metallurgy, metallography, and welding.

A chart in the brochure illustrates how the "Armour Plan," a cooperative method of attacking research problems, works for the sponsor of a research project in the metals field.

Free copies may be obtained from the Metals Research Department, Armour Research Foundation of Illinois Institute of Technology, 3350 S. Federal St., Chicago 16.

WSE Applications

In accordance with the By-Laws of the Western Society of Engineers, the following names of applicants are being submitted to the Admissions committee for examination as to their qualifications for admission to membership into the Society in the various grades, i.e., Student, Associate, Member, Affiliate, etc. All applicants must meet the highest standards of character and professionalism in order to qualify for admissions, and each member of the Society should be alert to his responsibility to assist the Admissions committee in establishing that these standards are met. Any member of the Society, therefore, who has information relative to the qualifications or fitness of any of the applicants listed below, should inform the Secretary's office. The Secretary's office is located at 84 East Randolph Street. The telephone number is RAndolph 6-1736.

216-53 Frank J. Misek (Trsf.), Engineering Assist.-V, Chicago Transit Authority, PO Box 3555.

217-53 Sheldon Schumacher, Civil Engineer I, City of Chicago, Dept. Public Works, 20 N. Wacker Drive.

218-53 Gordon C. Behnke, Jr. Designer-Estimator, United States Steel Corp. — American Bridge Div., 208 S. LaSalle St.

219-53 Robert Easterly, Civil Engineer, Ebasco Services, Inc., 2 Rector St., New York 6.

220-53 Gordon C. Meyers (Trsf.), Assistant Engineer, Teletype Corp., 1400 W. Wrightwood Av.

221-53 Neville Lancaster, Methods Engineer, American Phenolic Corp., 1830 S. 54th St., Cicero.

222-53 Edward J. Flanagan (Rein.), Contract Mgr. & Sec.-Treas., Kelso Burnett Electric Co., 223 W. Jackson Blvd.

223-53 John M. O'Neill, Sales Engineer, Anning-Johnson Co., 1514 W. Van Buren St.

224-53 Daniel E. Garey, Structural Engineer, Graham, Anderson, Probst & White, 80 E. Jackson Blvd.

225-53 Eugene G. Foster, Civil Engineer I, State of Illinois, Div. of Highways, 160 N. LaSalle St.

226-53 Irwin W. Szymanski (Trsf.), Senior Electronics Engineer, Cook Electric Co., 2533 N. Ashland Av.

227-53 Ernst W. Kettnich, Assist. Supt., Product Dev., Teletype Corp., 1400 W. Wrightwood Av.

228-53 John L. Nelson (Trsf.), Production Manager, Henry Pratt Co., 2222 S. Halsted St.

229-53 Walter C. Cleave, Vice President, Blyth & Company, 135 S. LaSalle St.

230-53 George Drevik, 5403 W. 23rd Pl., Cicero — attending University of Illinois.

231-53 James N. Farley, Control Engineer, Allen-Bradley Company, 445 N. LaSalle St.

232-53 Richard B. Foster, Jr., Engineer of Manufacture, Western Electric Co., Inc., Hawthorne Station.

233-53 Alfred C. Kengott, Development Engineer, Western Electric Co., Inc., Hawthorne Station.

234-53 Lee A. Freeman, Lawyer, 135 S. LaSalle St.

235-53 George M. Keane, Attorney, 69 W. Washington St.

1-54 Ruben J. Baer, Structural Engineer, Kornacker & Associates, 53 W. Jackson Blvd.

2-54 Don A. Long, Civil Engineer III, Illinois Division of Highways, 160 N. LaSalle St.

3-54 Fredolph A. Cerling (Rein.), Vice-Pres.-Chief Engineer, McKeown Bros. Co., 5303 S. Keeler Av.

4-54 John A. Clark, Chicago City Mgr., Thomas & Betts Co., 411 S. Sangamon St.

5-54 Robert M. Vaulman, 6612 S. Bell Av.,—attending University of Illinois, Navy Pier.

6-54 Jahn A. Harrington, Assist. Mgr.—Indust'l. Sales, Commonwealth Edison Co., 72 W. Adams St.

7-54 John J. McLaughlin, Jr., Vice President, Kelso-Burnett Electric Co., 223 W. Jackson Blvd.

8-54 Danial A. Sullivan, Staff Assist. to the Vice President, Commonwealth Edison Co., 72 W. Adams St.

Engineer Employers Are More Selective

June engineering graduates are finding jobs as plentiful as ever, but employers are becoming more selective in their hiring.

That's the college employment picture as described by Earl C. Kubicek, director of placement at Illinois Institute of Technology, Chicago.

"The days when the prospective employee could put his feet on an employer's desk and say, 'What's your offer?' are definitely past," Kubicek explained.

Although there has been no let-up in the demand for engineering graduates, all companies are exercising more care in choosing employees, he said.

"It wasn't long ago that most companies would hire anyone who could handle the job. Now they are looking for applicants who show the greatest promise and who will stay with the company, and not move to another firm or field," Kubicek stated.

There are fewer jobs available with large companies this year, but medium-sized and small firms have taken up the slack, according to the IIT placement director.

Engineering Societies Personnel Service, Inc.

New York Chicago Detroit San Francisco

These items are from information furnished by the Engineering Societies Personnel Service, Inc., Chicago. This SERVICE, operated on a co-operative, non-profit basis, is sponsored by the Western Society of Engineers and the national societies of Civil, Electrical, Mechanical and Mining and Metallurgical Engineers. Apply to ESPS, Chicago and the key number indicated. Prepared ENGINEERS AVAILABLE advertisements limited to 40 words, with typed resume attached may be submitted to ESPS Chicago by members of Western Society of Engineers at no charge.

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RECEPTIONIST'S CORNER

June is here at last and everyone is thinking of their gardens and fishing trips. If you are fishing for a new job or new employees, why not let us help you find what you are looking for. We are here to try and satisfy everyone. Our hours are from 8:00 until 5:00 Monday thru Friday and until 7:15 on Wednesday evenings. Won't you come in and talk things over?

J.H.

POSITIONS AVAILABLE

C-1883 METALLURGICAL TEACHER Ph.D. Met. Eng. or Met. Must be strong in theoretical and physics sides. Duties: teach both graduate and under graduate classes in metallurgical theory, physics, etc. Will also do considerable res. work. For a university. Salary: Open. Location: Chicago.

C-1887(a) METALLURGICAL ENGR. Met. Eng. 2 plus yrs. exp. in physical metallurgy, material specifications, failure investigations, metallography or material testing. Duties: those covering above requirements for exp. For a manufacturer. Sal.: open. Location: Pa.

C-1887(b) SALES ENGINEER ME or CE background. Age: 30-40. 2 plus yrs. exp. in sales background. Duties: traveling to contact potential customers primarily municipalities, selling a line of steel pipe. For a manufacturer. Salary: Open. Loc.: New York.

C-1888 RESEARCH AND DEVELOPMENT Grad. E.E. Age: 28 to 35. 5 plus yrs. exp. in electronic development and design. Duties: should have ability to take project and carry to completion. Ability to supervise others. Know electrical and electronic components. Salary: $6000 to $8000. Employer will pay fee. Location: Chicago.

C-1894 ERECTION SUPT. — TANKS. Age: up to 50. 1 plus yrs. exp. in the field of erection of steel tanks. Duties: supervise the erection of steel tanks. For a manufacturer of tanks. Sal.: $500-$700 per mo. Location: Headq. Chicago. Employer will negotiate fee. Some traveling.

C-1896(a) SALES ENGR. Engrg. Degree. Age: to 35. 3 yrs. exp. in sales to industrial distributors of mech. equip. Pumps preferably but not absolutely necessary. Duties: operate as regions manager, work with already established outlets, locate new distributors, contact OEM accounts. For a manuf. of Centr. Pumps. Sal.: $400-$500 mo. Loc.: Southeast or Southwest. Travel & car Reqd.

C-1898 CHIEF STRUCTURAL DETAILER. Age: 35-45. 4 plus yrs. exp. in structural steel detailing for a fabricator and either licensed or qual. to pass exam. for structural engrg. detailing & design for structural steel fabrication. For a Mfr. of Tanks. Sal.: $9-$11,000 Loc.: Chicago. Empl. will pay fee.

C-1906 CHEMICAL ENGINEER — Chem. Eng. Age: up to 50. 5 plus yrs. exp. in handling group in pilot plant work in organic products and supervise young engineers. Make plant layouts, cost, etc. For a manufacturer. Salary to $7500. Employer will pay fee. Location: Chicago.

C-1908 SALES — Engrg. Deg. Age: 28-40. 3 plus yrs. exp. in polyethylenes or thermo-plastics in chemical sales work. Duties: sales or sales supervision on polyethylenes and thermo plastics. For a mfgr. of chemicals. Salary: $485-$875 per mo. dep. on exp. Several locations. Home week ends. Car furnished.

C-1909 CHEMICAL ENG. Educ.: Chem. Eng. Pet. Eng. Age: 26-50. 3 plus yrs. exp. in pilot plant, process design, or unit operations. Know. Tower design desirable. Duties: designing new and experimental units, both commercial and research. For a refining mfgr. of pet. Sal.: $6000-$12,000. Loc.: Southern Chicago suburbs.

C-1911 SR. BUILDING CONST. ENGR. 3 plus yrs. exp. in institutional type construction. Duties: working on a major building program for a State institution. For Government Institution. Sal.: $6088. Loc.: New York.

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882 MW CHEM. ENGR. MS Tex. Chem. 47 Nineteen yrs. doing calculation of requirements, specifications, tests, developing, evaluation, trouble shooting, & production accounting in textiles & electronic fields. $7200 Chicago.

883 MW METHODS. 26 Six yrs. methods, time study, layout, estimating, processing, labor relations, standard data, and indirect labor routines. $5200 Chicago.

884 MW TIME STUDY. BA 28 Recently completed time and motion study course at Northwestern. No actual exp. Previous exp. approx. three yrs. in accounting, both public and private. $350 Chicago.

885 MW SALES MGR. 55 Thirty yrs. sales & engrg. of heavy hydraulic metal working equip., mechanical and electrical equipment and design supervision and operation. $12,000 Chicago.

886 MW SALES ENGR. Met. Engr. 26 Seventeen mos. calling on top level executives to sell communication equip., handled inventory as part of training program and contacts with gov't. and company research depts. $4200 Midwest.

887 MW METALLURGIST. Met. Eng. 28 Eleven yrs. prescribe & control heat treat of component parts, Supv. lab., investigate difficulties in production, chemical analysis evaluate incoming materials. $6000 South & West.

888 MW Constr. Supt. 52 Eight yrs. Complete charge of mining and milling operations and processing asbestos. Three yrs. preventive measures in fire control. $5000 U. S.

CRERAR LIBRARY
News and Notes

Under an agreement recently concluded with a UNESCO sponsored agency, Crerar now assists in providing documentation services to the scientists of India. Contents pages of 33 selected journals are microfilmed immediately upon receipt, and the film air mailed weekly to the Indian National Scientific Documentation Centre in New Delhi. From enlargements, a bibliographical journal is compiled and printed by offset; research workers are able to return their orders for copies of the articles to the INSDOC office before the actual issues are received in India by sea mail. It is estimated by the UNESCO Technical Assistance Team of INSDOC that the procedure should cut at least one month off the time taken to inform Indian scientists of latest articles, or six months if they rely on presently existing foreign abstract journals.

* * *

During the months of May and June, the Library is again being represented at various meetings of professional associations. Miss Ella Salmonsen, Chief of the Medical Department, attends the conference in Washington of the Medical Library Association. The Special Libraries Association meetings in Cincinnati were covered by Hazel Keener of Technology Reference and William Budington, Associate Librarian, while Herman Henkle, Librarian, participated in meetings of the Association of Reference Libraries in Minneapolis. Viola Gustafson, Assistant Librarian, and Mr. Budington also visited Minneapolis for the American Library Association Convention.

Is Water Fit to Drink?

The tipsy gentleman who recoiled at the thought of drinking water because "look how it rust pipes," would have been further appalled at the latest word of scientists today.

Dr. D. E. Thomas of the Westinghouse Atomic Power Division, Pittsburgh, Pa., told the American Institute of Chemical Engineers' Nuclear Engineering Congress that his firm's work on the first atomic submarine engine and other studies have shown water to be even more corrosive when very hot and under pressure.

Such metals as aluminum and magnesium, he said, are "completely disintegrated after a few hours in 600 degree Fahrenheit water." When not under pressure, water boils at 212 degrees.

Fortunately for the atomic engine builders, however, the metal zirconium proved able to withstand the corrosive attack of this "superheated" water, Dr. Thomas pointed out. Although poor grades of zirconium may disintegrate after a few days exposure, he said, "better grades may exhibit only slight attack" after a full year.

Thus zirconium was used as an important structural material in the atomic engine Westinghouse built for the Atomic Energy Commission and which will power the atomic submarine Nautilus. In this nuclear power plant, water circulates through the hot "uranium furnace" and carries the heat to a heat exchanger or boiler where steam is generated to drive steam turbines.

Studies have shown that impurities in zirconium weaken its corrosion resistance, Dr. Thomas reported, and so does any machining of the metal's surface. These zirconium corrosion studies, he said, have been a cooperative venture among the AEC's Metallurgy Project at Massachusetts Institute of Technology, Argonne National Laboratory, Battelle Memorial Institute, U. S. Bureau of Mines at Albany, Oregon, and Westinghouse.

Atomic Commission Releases Information

Information concerning the design, construction, and operation of a shockproof boron trifluoride proportional counter for the detection of thermal neutrons has been released by the Atomic Energy Commission. The counter, which was designed primarily for use in the submarine thermal reactor, the nuclear propulsion plant for the submarine Nautilus, has many potential industrial and research applications because of its sturdiness and ability to withstand high temperature.

The counter is one of three instruments especially developed to withstand the heavy stresses of submarine operating conditions and to resist the high temperatures of the nuclear power plant. Information concerning the other two instruments — a fission counter and an ionization chamber — has previously been issued.

The neutron counter was developed by the Westinghouse Electric Corporation under its contract with the Atomic Energy Commission for development and construction of the submarine thermal reactor.

The counter is an example of the invention of special equipment required for AEC work and of potential value in non-government activities. The Commission is making available detailed information for the benefit of any firm or person interested in using such equipment or manufacturing it for the AEC, its contractors or private industry. Details, including plans and specifications, may be obtained through the Pittsburgh Area Office, U. S. Atomic Energy Commission, Post Office Box 1105, Pittsburgh, Pennsylvania.

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Rettaliata Describes IIT Plans

Plans to broaden instruction and services in the fields of architecture, industrial design and city planning at Illinois Institute of Technology were described June 4 by President John T. Rettaliata, MWSE.

Dr. Rettaliata outlined the plans at a luncheon meeting in Chicago attended by leaders in those professions and representatives of the firms associated with them.

He said Illinois Tech expects to expand the curriculum and facilities of its departments of architecture and design and to create a new department of urban and regional planning within the coming year.

The departments are to be administrated as a new academic division of the Institute for which an outstanding leader in the general field of design will be sought as dean.

A new building, of advanced design by Ludwig Mies van der Rohe, director of the Institute's department of architecture, is contemplated that will house the division and permit inter-use of the three departments' facilities and talents, Dr. Rettaliata said.

Guests at the luncheon have volunteered to support the project through the organization of professional and industrial groups which will suggest curriculum additions, assist faculty and student recruitment efforts, and, at the outset, help finance the new building.

Dr. Rettaliata pointed out that the guests' guidance and leadership "will enable Illinois Tech to aid them in fulfilling their responsibilties to up-date the physical patterns of our time, during the 'middle place of great achievement' in the current industrial era.

"If the tremendous technological advances of the past few decades alone are merely equalled during the next 25 years, great adaptations will be necessary," he predicted.

"The shelters we live in, where they are placed, the tools we work with, the pictures we make, and the products we use . . . all must be newly conceived and designed to fit the developments of the present and future."

Dr. Rettaliata recalled that 70 years ago Chicago architects were taking forward steps in building which created modern architecture.

He called attention to the fact that Chicago has provided the "fertile soil" where the official successor to Germany's famed Bauhaus, the Institute of Design, often cited as the world's most creative design school, had become established. The Institute of Design is a branch of Illinois Tech.

Reviews of Technical Books

Electric Fields

Introduction to Electric Fields, by Walter E. Rogers. McGraw-Hill Book Company, Inc., 1954. 333 pages. $7.50.

This book was written for the senior student in electrical engineering. In order to read this book intelligently, the student should have previously had all of his background in electrical subjects in addition to differential equations and vector analysis. If the student has not had this background in mathematics, it will be necessary for the instructor to cover the material much slower and to teach the mathematics as the course progresses.

The book is well written. Fundamental concepts are treated in detail with physical interpretations.

A. D. Moore's recently developed fluid-mapping methods are used by the author as illustration and as an aid to visualization.

The treatment of vector potential contains a number of three-dimensional figures and aids to visualization which are ordinarily found in books at this level.

In addition to its use for senior electrical engineering students, practicing engineers who have the proper backgrounds in mathematics will find it stimulating.

R.G.O., W.S.E.

Industrial Traffic

Industrial Traffic Management, by Newton Morton and Frank H. Mossman, The Ronald Press Company, New York, 1954. 558 pages. $6.50.

The average person thinks about transportation as a pleasant, care-free experience which he has had when riding in a modern railroad train, commodious bus, stratocruiser, or palatial ocean-going vessel. He has watched freight trains pass over the street, or he has fretted and fumed while he waited for a long string of railroad cars to clear a grade crossing. Seldom has he stopped to consider the expert knowledge required to control the complicated movements of the various carriers which make accessible the many commodities which contribute to his pleasure and well-being.

The college student eventually thinks about entering the business world; about being responsible for part of the great national output. He becomes conscious of the significance of assembling materials from distant places, and the marketing of finished goods. Courses in sales management, materials handling, marketing and traffic problems become important. It is for courses of this type that "Industrial Traffic Management" by Professors Morton and Mossman supplies a real need.

The book was written specifically for buyers of transportation; and discusses the many problems confronting the shippers of goods to both domestic and foreign markets. It also emphasizes the duties and responsibilities of the traffic department to the accounting, production, purchasing, and sales divisions of the corporation. The principles and procedures applicable to industrial transportation of all kinds are analyzed, and a fund of practical knowledge is provided. Freight classification, Railroad Rate Territories, Motor Carrier Rate Territories, Class and Commodity Rates, Rules, Regulations, and Routing routines are thoroughly treated, each illustrated by actual cases, and decisions of the Interstate Commerce Commission and the Supreme Court.

Various aspects of packing, marking, and loading freight; types of equipment available, warehousing, and shipping by air, land, and water are well covered. There are many illustrations of sources of information, and various forms used in the industry, such as freight classification, rate tariffs, bill of lading, forms for reporting loss and damages, letter of credit, export declaration, etc.

With the exception of a few passages where references to cases illustrating the subject interfere with the continuity of the presentation, the book is well written and should be easily understood by those who are quite ignorant of transportation principles. The summary at the end of each chapter is particularly helpful. This book is an excellent text for courses in Traffic Management; it should be required reading for students in Marketing, Materials Handling, Sales Management, and other courses in the field of Business Administration; it should be on the desk or easily available for every traffic manager.

M.S.

Electronics Mathematics

Elements of Mathematics for Radio, Television and Electronics, by Bernhard Fischer and Herbert Jacogs, The MacMillan Company, New York, 1954. 569 pages. $5.40.

This book was written as an elementary text in basic mathematics for those students interested in radio, television and allied electronic fields.

The book consists of two parts. The first fifteen chapters constitute part one, which is the non-algebraic part. Part one begins with a survey of the principles of arithmetic and application to problems in radio and television. Fundamental operations with whole numbers, common fractions and decimal fractions are reviewed. Practical subjects such as percentage, use of tables, monographs and curves, slide rule and elements of applied geometry are discussed.

Chapters 16 to 33, which constitute the second part of the book, include negative numbers, literal equations, ratio and proportion exponents, elements of logarithms and a discussion of sine and square waves.

A number of technical topics not ordinarily found in radio mathematics texts, which aid the beginner in understanding basic principles in the field, have been included.

R.G.O., W.S.E.

Pakistan Production Is Raised

The industrial output of Pakistan could be more than doubled through more thorough training in efficient production techniques.

The statement comes from George D. Thomas, machine tool technologist with Armour Research Foundation of Illinois Institute of Technology, Chicago, who just returned from a 10-month stay in Pakistan as advisor to small industries.

Thomas cited the case of one Pakistani industry that boosted its output nearly 800 per cent by making some simple changes:

"The shop turned out three ceiling fans in an eight-hour day," he said. "About 80 per cent of the work was done by hand.

"It was recommended that some simple dies be made, so that some of the operations performed by hand could be done on machines that were already available.

"The recommendations were followed. When I left, the shop was turning out 23 fans during its eight-hour day."

Thomas was working with the Foreign Operations administration in Pakistan under the Point IV program administered by the Department of Commerce. He was there as a staff member of Armour Research Foundation.

His base was in Karachi, in West Pakistan, but during his stay he traveled throughout the entire country.

How do you go about advising an industrialist on how to improve production and quality?

"The Pakistan Department of Supply and Development would simply arrange to have the industrialist introduced to me. I'd go to his shop, spend anywhere from a week to 10 days there, and come up with whatever suggestion I could toward improving the work quality and product through utilizing present equipment more efficiently.

"The suggestions often were to have new dies, jigs, or fixtures made. Occasionally, they involved changing a floor plan.

"The results were gratifying. Some industries doubled and trebled their output. In one instance, the output went from five pieces per hour to 300 pieces an hour."

Thomas told of one company that produced belt pulleys. By only redesigning the pulley—which was old-fashioned and inefficient—about 50 per cent of the material was saved and many of the unnecessary hand operations were eliminated.

The shop now produces two-and-a-half times as many belt pulleys as previously, Thomas said.

The ordinary Pakistani shop worker is highly skilled, but seldom has any technical background, he pointed out.

"If it were possible to train enough of these workers in the proper use of tools, in good production procedures, in using their imaginations to improvise for problems they hadn't encountered before, I'm confident the increase in industrial output would be astounding," he commented.

At present, Pakistani and American government authorities are studying the feasibility of opening an institute which would provide better technical training for Pakistani workers, Thomas said.

Sweden, England, Australia, Canada, and several European countries, in addition to the United States, have been giving Pakistan technical assistance.

Thomas was scheduled to return to Pakistan by the beginning of June. The Pakistani government has requested that the Foreign Operations administration retain Armour Research Foundation and Thomas for another two years.

A native Chicagoan, Thomas is a 1933 graduate of Illinois Institute of Technology. He had 19 years of production experience before joining the Foundation staff in 1953.

IIT Establishes Oil Hydraulics Lab

An educational and research laboratory in oil hydraulics—the most complete such facility in the United States—has been established at Illinois Institute of Technology in Chicago.

The new IIT laboratory offers a broad educational program ranging from intensive short courses (the first of these is being given this summer) to graduate-level research.

The program was set up at the request of numerous industries now using oil hydraulics, according to Dr. Victor L. Streeter, research professor of mechanics at Illinois Tech.

Equipment for the new laboratory at IIT has been donated by companies in the hydraulics field. The companies benefit in two ways, Streeter explained: by having their equipment displayed and used, and by affording training to students who are potential employes.

"While not new," Streeter said, "oil hydraulics is becoming increasingly important. This is because it can deliver more power than electricity for a given weight or space. In the modern factory practically every machine tool is powered or controlled by oil hydraulics."

Increased use of automation (factory operations in which parts are processed mostly without human effort) is bringing with it a greatly increased demand for oil hydraulics, Streeter said.

"The new program at Illinois Tech is designed to help meet the need for more education and research in this growing field," he said.

X-Ray Metallurgical Course Set

Metallurgical Applications of x-ray Diffraction will be the subject of a two-week Special Summer Program from August 2 through August 13 during the 1954 Summer Session at the Massachusetts Institute of Technology.

Professor Ernest H. Huntress, director of M.I.T.'s Summer Session, says the program will provide discussions of the principles of x-ray diffraction illustrated by examples of the practical techniques employed in metallurgical problems. It will be under the direction of Dr. John T. Norton, Professor of the Physics of Metals in the M.I.T. Department of Metallurgy.

Professor Norton will be assisted in presenting the program by other members of the M.I.T. Faculty and staff and by a number of guest lecturers including:

Dr. A. L. Geisler, General Electric Research Laboratories, Schenectady, New York.

Dr. Herbert Friedman, Naval Research Laboratory, Washington, D. C.

Professor B. D. Cullity, Metallurgy Department, Notre Dame University, South Bend, Indiana.

"Experience over the last 20 years," Professor Norton points out, "has shown the very considerable importance of x-ray diffraction methods in the study of solids in general—and of metals in particular.

"The information these methods yield is fundamental in character," Professor Norton continues. "If experiments are to be planned intelligently and if the full potential of the results is to be realized, a basic understanding of the principles of the several phenomena involved is necessary."

The program at M.I.T. is planned to include lectures in the mornings and laboratory demonstrations and discussions in the afternoons. Topics to be considered will include: emission and absorption of x-rays; the diffraction process; interpretation of powder diffraction patterns; precise lattice constant determination; application to study of phase diagrams; film cameras and diffractometers; crystal orientation; texture and preferred orientation; measurement of residual stress; and x-ray fluorescent analysis.

Further information and application blanks for the Special Summer Program in Metallurgical Applications of X-Ray Diffraction may be obtained from the Summer Session Office, Room 7-103, M.I.T., Cambridge 39.

Memorial Room Is Dedicated by ASTM

The Warwick Memorial Room in Headquarters of the American Society for Testing Materials, Philadelphia, was dedicated during a meeting of the Board of Directors on May 10. The dedication consisted of the unveiling of an oil painting of C. Laurence Warwick and the mounting of two bronze plaques — the central tablet inscribed "This room is dedicated to the memory of C. Laurence Warwick who served the Society with distinction 1909-1952" and citing positions in which he served the Society.

Mr. Warwick, long-time Executive Secretary of ASTM passed away suddenly on April 23, 1952. As administrative head of the Society since 1919, he had made many notable contributions in the field of standardization and research in materials and was recognized as an outstanding leader in the standardization movement in this country. While he was instructor and Assistant Professor at the University of Pennsylvania, he also served as Assistant Secretary of ASTM with Edgar Marburg, the Society's founder secretary. In 1919 on the death of Dr. Marburg, he was appointed Secretary-Treasurer (chief executive officer) and in 1946 became Executive Secretary.

Dr. L. C. Beard, Jr., ASTM President (Assistant Director, Socony-Vacuum Laboratories, Socony-Vacuum Oil Co., Inc.) presided at the ceremony. Mr. Norman Mochel, who assumes the ASTM presidency at the close of the 1954 Annual Meeting, (Manager, Metallurgical Engineering, Westinghouse Electric Corp.) recalled Mr. Warwick's sincerity and integrity, his extremely fair and considerate view-point, his broad knowledge, his competence as an administrator and executive, and acclaimed him as a gentleman who had earned the respect, admiration, and friendship of all who knew him.

EJC Issues Report On Income Survey

Engineers Joint Council announced recently the publication of "Professional Income of Engineers—1953." This 32 page publication is the final report of a survey conducted in 1953 by the EJC Special Surveys Committee. Mr. Maynard M. Boring, Manager, Technical Personnel Division, General Electric Company, and representing the American Society for Engineering Education on the Committee, is Chairman.

The report contains information covering the professional income of about 72,000 engineers employed in industry, government, and engineering education. This represents about 22% of the total of engineers estimated to be employed by industry and engineering education. The basic presentation of data is in relation to year of receipt of first degree in engineering.

The income of engineers employed in industry is presented by type of industry in which employed. This is a departure from practices employed in earlier surveys which presented data by engineering specialties. EJC believes that presentation in this manner will prove to be more useful.

In engineering education, the information reflects total income from the practice of the profession of engineering as well as income from teaching activities alone. The summary of starting salaries offered during 1953 to new engineering graduates by type of industry is also included.

This report provides the most comprehensive study of engineering professional income since the monumental work "The Engineering Profession in Transition" published in 1947. As such, it will be of great interest and value to all concerned with questions of engineering income. The report is available from Engineers Joint Council, at 29 West 39th St., New York 18, N. Y., at $2.00 per copy with a discount of 50% for single copies to members of constituent societies of EJC.

WSE Personals

Virgil E. Gunlock, MWSE, is slated as the successor to **Ralph Budd,** HMWSE, as chairman of the board of the Chicago Transit Authority.

Budd, known in the public mind as "Mr. Railroad" is turning his responsibilities over to a man who is being thought of in Chicago as "Mr. Engineer." In 1938 Gunlock first did work for the city. He has done considerable work for Chicago since then. He was resident engineer supervising work on the State st. subway, Chicago's first. Since then he has been the guiding hand behind the planning and construction of the half-billion dollar superhighway system now abuilding. Included in this is the Congress st. super-highway, in process.

Chicago's new off-street parking program, recently begun, to cost 50 million dollars, and include nine king-size garages, is one of Gunlock's contributions to the city. He inaugurated that building program only months ago. His planning and supervision was also behind such projects as the Lake Shore extension and the Wacker drive extension.

Budd is quoted as saying of Gunlock, "He'll make a very fine CTA board chairman." Budd is going into a very much deserved retirement. His contribution to Chicago, the United States, and the world is considerable. He became a member of the Western Society in 1932 and was made an honorary member in 1948.

Gunlock joined the Society in 1944.

E. A. Armstrong, LMWSE, manager of industrial sales for the Commonwealth Edison Company, retired June 1 after more than 33 years of continuous service.

Armstrong was associated with industrial and power sales work during his entire career in various supervisory and executive capacities. He began his career in 1921 with the Public Service Company as a power salesman.

An electrical engineering graduate of Michigan State College, Armstrong, besides his membership in the Western Society, is a life member of the American Institute of Electrical Engineers. Armstrong is active in various community affairs. His hobbies include geology, astronomy, and metal-working in his basement shop.

* * *

Miss Lillian Stemp, MWSE, safety consultant, and vice-chairman of the printing and publishing section of the National Safety Council, received an invitation from President Eisenhower to attend the President's Conference on Occupational Safety, scheduled for May 4-5-6 in Washington, D.C.

Miss Stemp will be remembered by Society members as the author of the paper "The Engineer and the Prospective Employer," which won her a Prize Paper Award from WSE last year. Another of her notable achievements is the writing of the *Safety Manual for the Graphic Arts Industry*, a publication jointly sponsored by the National Safety Council and the Education Council of the Graphic Arts Industry of Washington, D. C.

Her schedule upon her return from Washington called for her participation in the Eighth District Conference of the International Association of Printing House Craftsmen, Inc., at Cedar Rapids, Iowa, and to deliver an address on safety and include a first-hand report on the President's conference.

* * *

Alex D. Bailey, MWSE, was elected president of the Union League Club of Chicago and assumed the duties of his new office at the Annual Meeting of the Club on June 1.

Bailey, who retired from his position as vice-president of the Commonwealth Edison Company on Feb. 1, 1952 after being with the company for nearly 50 years, is the 67th president of the Club since its founding in 1879.

He was graduated in 1903 from the Lewis Institute with the degree of Mechanical Engineer, and also holds honorary degrees from Northwestern University and from the Illinois Institute of Technology.

A former first vice-president of the Union League Club of Chicago, Bailey, besides his membership in the Western Society of Engineers, is a member of the American Society for Engineering Education.

* * *

George R. Bailey, MWSE, took office as the first vice-president of the Union League Club of Chicago on June 1 at the Club's annual meeting. He heads the real estate company which carries his name.

Born in Baldwin, Wis., Bailey was graduated from high school in Tampa, Fla., and the University of Minnesota. He has a degree in civil engineering.

Bailey's first job after graduation was as an industrial welding engineer. This was with the Smith Welding Company in Minneapolis, in 1922. A year later he became an engineer with the American Telephone and Telegraph Company and the Illinois Bell Telephone Company. Subsequently he became a research engineer with the National Association of Building Owners and Managers in Chicago. In 1928 he associated himself with Albert H. Wetten and Company, a real estate firm, G. R. Bailey and Company since the death of Mr. Witten in 1953.

Bailey is vice-president of the Building Managers Association of Chicago, and president of the Loft Building Association, Chicago. Nationally known, he is a consultant on office building planning and layout.

Industry Prosperity Said Due to Engineer

The prosperity of the nation's larger industries is due largely to the influence of the engineer, Dr. John T. Rettaliata, MWSE, president of Illinois Institute of Technology, told a management group recently.

Although engineering colleges constitute only a tenth of all higher educational institutions in the country, nearly half of the major corporations are headed by executives with engineering or scientific backgrounds, Dr. Rettaliata said.

Referring to a recent survey of the executive ranks of the 300 largest corporations, the Illinois Tech president said 30.8 per cent had backgrounds in business economics, while 45.5 per cent were educated as engineers or scientists. The remaining 23.7 per cent were educated in law or the arts.

"Considering the excellent state of corporate health, it must be concluded the engineer has done a good job," he said.

Dr. Rettaliata spoke on "Technology's Role in Management" at a dinner meeting of the Clearing chapter of the Society for the Advancement of Management.

Speaking of the changes technology has forced upon industry and especially management, Dr. Rettaliata traced the history of the foreman.

"Perhaps no job in industry has changed during the past few decades as much as the foreman's," he said.

Years ago, when a vacancy appeared, the best producer was given the job without regard to his knowledge of industrial relations, he continued.

"But with the increasing technology, and its emphasis on more production in less time, came scientific management which rendered this old kind of foreman obsolete.

"Such duties formerly performed by the foreman—such as hiring, layoff, establishment of wages, and maintenance—were studied scientifically and departmentalized in industry," he said.

Pointing to the projected increase in population and its resulting expansion in industry, Dr. Rettaliata warned that the complexities of management will hit industry even harder in the future.

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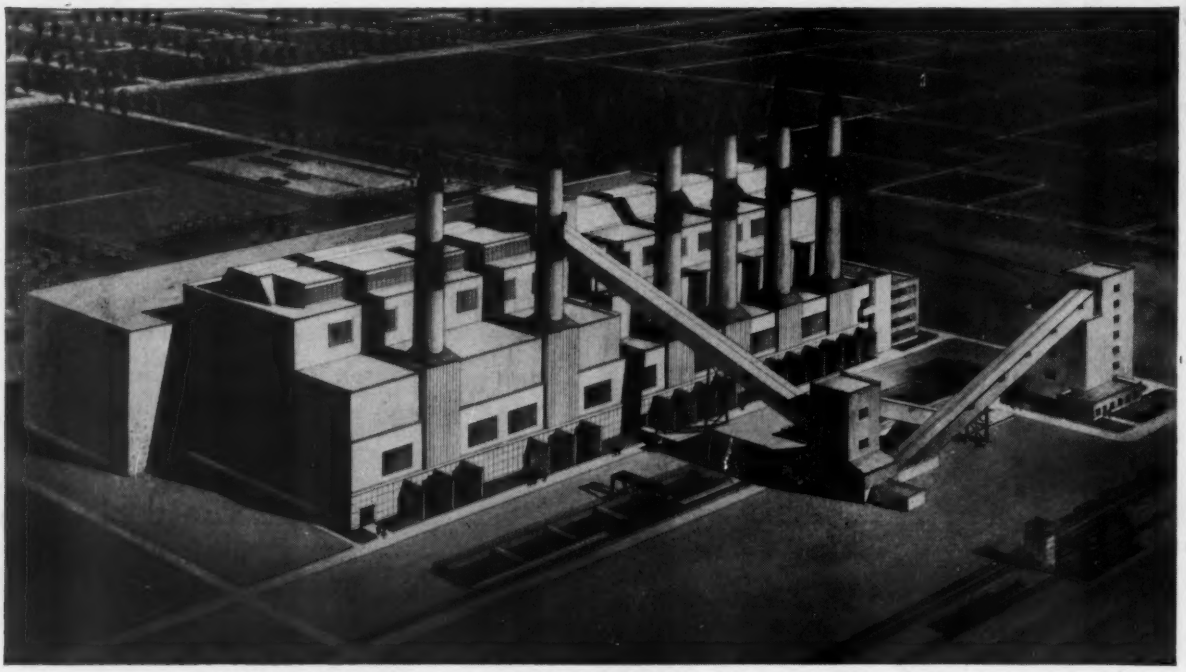

Ridgeland Generating Station. The fourth 150,000-kw Turbo-generator unit going into service this month will raise the station's capacity to 600,000 kilowatts.

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